Remarks/Argument

This paper is submitted in response to the Office Action mailed August 20, 2004, and is being filed in conjunction with a Request for Continued Examination under 37 C.F.R. 1.114. Per the petition and fee submitted herewith, the Applicant has extended the response deadline from November 20, 2004 to February 22, 2005 (February 20, 2005 being a Sunday, and February 21, 2005 being a Federal holiday in the District of Columbia). No further fee is believed due for filing this paper. However, if a fee is due, please charge deposit account no. 50-2719.

Claims 96-132 are pending in the application, and claims 96-106, 111-114, 116-126, 131 and 132 have been withdrawn from consideration. Claims 107-110, 115 and 127-130 are under consideration.

By operation of this amendment, claims 96, 97, 104, 107, 111, 113, 114, 115, 116, 118, 120, 121 and 127 have been amended; claim 101 has been canceled without prejudice; and new claims 133-165 have been added.

Claims 96, 104, 107, 111, 118, 121 and 127 have been amended to recite that the particular food or substance recited in the respective claims is treated with super critical fluid or critical liquid gas for a sufficient time to reduce allergenicity. Support for these amended claims is found in paras. [0039] of the published specification.

New claims 133, 137, 141, 145, 149, 153 and 157 specify that the particular food or substance recited in the respective claims reaches a temperature of -320 °F. Support for these new claims is found in para. [0039] of the published specification.

New claims 134, 138, 142, 146, 150, 154 and 158 specify that the particular food or substance recited in the respective claims is treated with super critical fluid or liquid nitrogen for 10 minutes. Support for these new claims is found in para. [0275] of the published specification.

New claims 135, 136, 139, 140, 143, 144, 147, 148, 151, 152, 155, 156, 159 and 160 specify that the particular food or substance recited in the respective claims is treated with super critical fluid or liquid nitrogen for 15-30 minutes or for over 30 minutes. Support for these amended claims is found in para. [0040] of the published specification.

No new matter has been added. Based on the above changes and the following remarks, the Applicant respectfully requests reconsideration of the claims.

Response to Election/Restrictions

The Office Action considers claims 96-106, 111-114, 116-126 and 131-132 to be directed to an invention that is independent or distinct from the originally claimed invention, because these claims are drawn to products which were previously withdrawn, or which were previously claimed in the collective. The Applicant respectfully disagrees, and requests that claims 96-106, 111-114, 116-126 and 131-132 be rejoined and examined together with claims 107-110, 115 and 127-130.

Claims 107-110, 115 and 127-130 are drawn to methods of reducing allergenicity in milk. However, the first restriction requirement dated September 18, 2002 restricted the claims into two inventions: one directed to methods for treating products to reduce allergenicity, and one directed to the products themselves. On November 18, 2002, the Applicant elected the first invention for prosecution (method for treating products). The species of biologic products (which includes foods) was also elected at this time.

A second restriction requirement was issued on May 5, 2003 requiring the Applicant to elect a single disclosed species for prosecution on the merits. On June 13, 2003, a further restriction requirement was issued that was identical to the one issued on May 5, 2003. On June 19, 2003, the Applicant elected the species drawn to the use of super critical fluid or critical liquid gas to reduce the allergenicity of food. No particular foodstuff was specified, or required to be specified, in the restriction requirement. The Applicant's election was accepted, and an Office Action on the merits issued on August 29, 2003, which examined claims 65-81.

Claim 62 recites that a "food" or "food derived product" can be treated to reduce allergenicity. Para. [0030] of the published specification defines "food" as any compound or composition intended for consumption. Paras. [0017] and [0019] disclose that a food according to the invention can be peanut, milk or egg products. Para. [0048] discloses an even more extensive list of foods according to the invention, including chocolate, wheat, corn, pork, soybean, tomato, orange, fish and other seafood, spices, condiments, wine, cheese and products of fermentation. Para. [0009] discusses "superantigens" such as peanut, tree nut, shrimp and lobster.

Claims 62-81, which were subjected to substantive prosecution in the August 29, 2003 Office Action, and claims 96-106, 111-114, 116-126 and 131-132 contain the same or similar recitations of foods in general and of the particular foods discussed above. Thus, the products which the Office Action characterizes as "non-elected" have already been searched and examined. Thus, there cannot

be any further burden on the Examiner to search and examine claims 96-106, 111-114, 116-126 and 131-132 on the merits. The Applicant therefore believes that the present restriction of claims 96-106, 111-114, 116-126 and 131-132 is improper, and that these claims should be examined together with claims 107-110, 115 and 127-130. For the same reasons discussed above, new claims 133-140 and 145-162 and 164-165[1] should also be examined together with claims 107-110, 115 and 127-130.

Response to the section 112, 1st paragraph rejections

Claims 107-110, 115 and 127-130 are rejected under 35 U.S.C. 112, 1st paragraph as allegedly lacking written description for the use of "super critical or critical liquid nitrogen." According to the Office Action, no basis was found for this claim element in the specification. However, the specification contains an express disclosure of this claim element. See, *e.g.*, para. [0038] of the published specification, which states (emphasis added):

> It has been unexpectedly discovered that the allergenicity of foods may be reduced by treatment with a super critical fluid, preferably super critical carbon dioxide, or ***a critical liquid gas, preferably liquid nitrogen***.

Thus, the element of "said critical liquid gas (being) liquid nitrogen" has express written description support in the specification. The Applicant respectfully requests withdrawal of the 35 U.S.C. 112, 1st paragraph rejection of claims 107-110, 115 and 127-130.

Response to the section 112, 2nd paragraph rejections

Claim 115 is rejected under 35 U.S.C. 112, 2nd paragraph as allegedly being unclear for reciting the step of assaying for allergen content of the treated milk. According to pg. 3 of the Office Action, "it is not clear where in the process 'the milk' is assayed for allergen content." Claim 115 has been amended to specify that the allergen content of the milk is assayed after treatment with super critical fluid or liquid nitrogen. The Applicant respectfully requests that the indefiniteness rejection of claim 115 be withdrawn.

[1] New claims 141-144 and 1623 depend from claim 107, which is currently under consideration. Thus, new claims 141-144 should also be considered on the merits.

Claim 128 is rejected under 35 U.S.C. 112, 2nd paragraph as allegedly being unclear because "the scope of 'fine particle milk' is unclear." See the Office Action, pg. 3. A claim is definite when one skilled in the art would immediately understand the scope and meaning of the claim. Here, one skilled in the art would understand the term "fine particle milk" as representing the routine powdering of dried milk, for example through the use of a tower sprayer. See, *e.g.*, para. [0272] of the published specification, which discusses the production of fine particle milk from evaporated skim milk. One skilled in the art was aware, as of the filing date of this application, of the technology and parameters surrounding the production of fine powder milk. See, *e.g.*, Mermelstein NH (2001), *Food Technol.* 55(4): 92-96 (enclosed), which discusses production of food, including milk, particles by spray drying. In particular, Mermelstein notes in his introductory paragraph that spray drying is a technique which has been used for many years.

Claim 128 is therefore clear and definite, and the Applicant respectfully requests that the indefiniteness rejection of claim 128 be withdrawn.

Claims 127-130 are rejected under 35 U.S.C. 112, 2nd paragraph as being unclear because the scope of the term "about" is allegedly unknown. However, a claim is not *per se* indefinite for using the word "about." W.L. Gore & Assocs., Inc. v. Garlock, Inc., 721 F.2d 1540, 1557 (Fed. Cir. 1983). The meaning of "about" in reference to a claimed range is dependent on the context of the claim and the precision of the measurements used to evaluate the claimed range. Chemical Separation Technology Inc. v. United States, 63 USPQ2d 1114, 51 FedCl 771 (US Ct. Fed. Cls. 2002). The word "about" in a claim is therefore not considered broad or arbitrary, but can rather mean "approximately." Id at fn 4. As noted by Robert L. Harmon, Patents and the Federal Circuit §5.6(b) at p. 251 (5th ed. 2001):

> The use of the term "about" permits some leeway in the amount of a required constituent in a claim. Such broadening usages as "about" must be given reasonable scope; they must be viewed by the decision maker as they would be understood by persons experienced in the field of the invention. Although it is rarely feasible to attach a precise limit to "about," the usage can usually be understood in light of the technology embodied in the invention.

Here, claim 127-130 recite the step of heating milk at about 150°F for about 20 minutes. One skilled in the art would realize that this step indicates that the milk should be heated for approximately 20 minutes, within the normal error associated with measuring time with the

equipment normally employed during such procedures. The use of the term "about" in claims 127-130 is therefore not unclear in scope, and the Applicant respectfully requests that the indefiniteness rejection of these claims be withdrawn.

Response to section 102(b) rejections

Claims 107 and 110 are rejected under 35 U.S.C. 102(b) as allegedly being anticipated by US Pat. No. 5,07,634 to Schmitt or by US Pat. No. 4,848,094 to Davis. The Applicant respectfully disagrees.

Schmitt discloses a process for producing a finely divided solid by dissolving the solid in a liquid solvent, and then contacting the dissolved solid with a compressed liquefied gas, supercritical fluid or dense vapor atmosphere. The compressed liquefied gas, supercritical fluid or dense vapor in the atmosphere is an anti-solvent or non-solvent. Upon contact with the anti-solvent or non-solvent atmosphere, the dissolved solid crystallizes into fine particles. According to the Office Action, the solid to be dissolved can be food, such as powdered milk.

A claim is anticipated by a reference only if that reference contains every element of that claim. Absence of any claim element from the reference negates anticipation. Here, claims 107 and 110 have been amended to specify that the milk antigens treated with the super critical fluid or critical liquid gas are undissolved. Basis for these amendments can be found throughout the specification, which discloses the treatment of foodstuffs that have not been pre-dissolved with a super critical fluid or critical liquid gas. See especially para. [0048], which discloses that "[f]oods . . . may be molecularly modified in a similar fashion to enhance tolerance by the allergic population, by treatment with a super critical fluid *solvent*."[2] Treatment of the foodstuffs with a solvent would, *a fortiori*, indicate to one skilled in the art that the treated foodstuff is not already dissolved.

In contrast, the method of Schmitt requires that the solid be dissolved prior to treatment with super critical fluid or critical liquid gas. Because Schmitt does not disclose every element of

[2] MPEP 2163.02 states that "the subject matter of a claim need not be described literally (*i.e.*, using the same terms or *in haec verba*) in order for a disclosure to satisfy the written description requirement." Rather, the specification must convey with reasonable clarity to one skilled in the art that, as of the time of filing, that the applicants had possession of the later-claimed subject matter. The specification clearly shows that the foodstuffs treated according to the claimed methods are undissolved prior to treatment. Therefore, claims 107 and 110 as amended are fully described by the specification.

amended claims 107 and 110, the anticipation rejection of these claims over Schmitt should be withdrawn.

Davis discloses a method for producing essentially spherical, substantially uniform frozen droplets of a composition such as milk. According to col. 4, lines 58-61, "[f]rozen droplets as used in the specification and claims herein means essentially spherical particles having at least a crust of solid material at the outer surface of the spherical particle." The frozen droplets are formed by spraying a liquefied compositions into a cryogenic fluid. Column 7, lines 8-12 of Davis further states that (emphasis added):

> It is necessary to remove the frozen droplets continually ***and rapidly*** to prevent agglomeration of frozen droplets which contact unfrozen liquid feed droplets on the liquid cryogen bath surface.

Claims 107 and 110 recite that undissolved milk allergens are treated with a super critical fluid or critical liquid gas for a sufficient time to reduce the allergenicity of the milk antigens. The specification differentiates the methods recited in claims 107 and 110 from the food-freezing method of Davis in para. [0039]:

> For freezing, foods are typically immersed in liquid nitrogen for a few (1-15) seconds, with equilibrium at 0 ^{o}F, to form small crystals that don't distort taste and to form a crust and prevent adhesion. . . . According to the present invention, foods are submerged in liquid nitrogen for a sufficient time, generally several minutes, to reduce allergenicity.

Davis therefore does not any express disclosure of treating milk antigens with super critical fluid or a critical liquid gas (such as liquid nitrogen) for a sufficient time to reduce the allergenicity of milk antigens. Rather, Davis simply discloses a food-freezing method in which droplets of milk are frozen and quickly removed from the cryogenic fluid.

Davis also does not inherently produce milk antigens with reduced allergenicity. A claim feature is inherently disclosed in a reference only if that feature necessarily flows from the teachings of the reference. MPEP 2112 and Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). Moreover, the fact that a certain result or characteristic may occur or be present in the prior

art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993); In re Oelrich, 666 F.2d 578, 581-82, 212 USPQ 323, 326 (CCPA 1981). Here, the milk droplets disclosed in Davis are contacted with the cryogenic liquid only for long enough to freeze, and the droplets are quickly removed. There is nothing in Davis which shows that milk antigens with reduced allergenicity would necessarily be produced by the Davis food-freezing method. Indeed, the fact that the droplets are removed from the cryogenic liquid as quickly as possible in the Davis method belies the production of droplets with reduced-allergenicity milk antigen.

Because Davis does not disclose, either expressly or inherently, every element of amended claims 107 and 110, the anticipation rejection of these claims over Schmitt should be withdrawn.

Response to section 103(a) rejection

Claims 108, 109 and 127-130 are rejected under 35 U.S.C. 103(a) as allegedly rendered obvious by Davis in view of Schmitt. The Applicant respectfully disagrees.

To render a claim obvious, a reference or combination of references must suggest to one skilled in the art that the claimed invention can be made and successfully practiced. Both the suggestion and the reasonable expectation of success must be found in the prior art, and not in the applicant's disclosure. Here, there is no suggestion in the cited references, either alone or in combination, that the methods of claims 108, 109 and 127-130 can be successfully made and practiced.

As discussed above, Schmitt discloses a method for the production of a finely divided solid by dissolving the solid in a solvent, and then contacting that solvent/solute mixture with an anti-solvent. There is no teaching or suggestion that the process would result in a reduction of allergenicity. There is also no teaching or suggestion in Schmitt that the disclosed process could or should be modified to produce a food with reduced allergenicity. In fact, Schmitt teaches that dissolving the solid in a solvent before contact with a super critical fluid is essential for the preparation of finely divided solids by the disclosed process (see, *e.g.*, col. 3, lines11-19 of Schmitt).

Davis discloses a food-freezing process by which droplets of a liquid composition are sprayed into and quickly removed from a cryogenic liquid. The liquid composition is not dissolved in a solvent before spraying into the cryogenic liquid. There is no teaching or suggestion in Davis that

the disclosed method could or should be modified in order to produce a reduced-allergenicity food. In fact, the short cryogenic exposure times in Davis teach away from using the Davis method for producing reduced-allergenicity foods, because such short exposure times are insufficient to reduce allergenicity.

Moreover, there is no motivation to combine the teachings of Schmitt and Davis to produce the methods of claims 108, 109 and 127-130. Schmitt requires the solids to be dissolved in a solvent before mixing with a super critical fluid. However, the Davis method involves the freezing of liquid droplets, and the method does not entail dissolving the liquid compositions before spraying them into a cryogenic liquid. Modifying the method of either Schmitt or Davis to incorporate elements of the other would destroy the intended operation of either method. Therefore, one skilled in the art would not be motivated to combine the teachings of Schmitt and Davis to arrive at the methods of claims 108, 109 and 127-130.

Even if one skilled in the art did combine the teachings of Schmitt and Davis, the teachings of these two references do not suggest that the resulting method would produce a reduced-allergenicity food. In fact, because of elements like the use of a pre-dissolved solid in Schmitt and the short cryogenic liquid contact times from Davis, one skilled in the art would think it unlikely that a reduced-allergenicity food would actually be produced.

The teachings of Schmitt in combination with Davis would therefore not suggest to one skilled in the art that the claimed methods for producing reduced-allergenicity foods should be made, nor would they provide a reasonable expectation that such methods could be successfully made and practiced. The Applicants respectfully request withdrawal of the obviousness rejection of claims 108, 109 and 127-130.

Claim 115 is rejected under 35 U.S.C. 103(a) as allegedly rendered obvious by Davis in view of Schmitt and the Applicant's alleged admissions in para. [0051] of the published specification. The Applicant traverses the rejection.

The teachings of Schmitt and Davis are discussed above. The alleged admission of para. [0051] involve the well-known use of immune assays such as RIA or ELISA to detect allergen levels in food. The information disclosed in para. [0051] does not remedy the deficiencies of Schmitt and Davis discussed above. Thus, the combination of Schmitt, Davis and the information in para. [0051]

would not suggest to one skilled in the art that the methods of claims 108, 109 and 127-130 could be successfully made and practiced. The Applicants respectfully request withdrawal of the obviousness rejection of claims 108, 109 and 127-130.

Conclusion

Based on the foregoing, the claims are believed to be in condition for allowance. An early and favorable action toward that end is earnestly solicited.

Respectfully submitted,

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NEIL H. MERMELSTEIN
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Spray Drying

Spray drying is not a new technology. It has been used for many years—C.E. Rogers Co., for example, has been manufacturing spray dryers since the early 1900s—and is a standard technology in the food industry, especially the dairy industry. Nevertheless, incremental improvements are always being made.

In a typical spray dryer, a solution, suspension, or emulsion is pumped to an atomizer at the top of the drying chamber. The atomizer—a rotating wheel or a nozzle—sprays the liquid into a high-velocity stream of hot air or other gas, producing droplets. As the droplets pass through the hot air flow—which can be cocurrent with the liquid, countercurrent, or a combination of both—the moisture rapidly evaporates. The large particles fall to the bottom of the chamber and are collected. Fine particles entrained with the exhaust air are generally collected by passing the air through a series of external cyclones, scrubbers, or bag filters.

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According to Jeff Bayliss (phone 410-922-5900), Vice-President, Spray Drying Systems, Inc., the heat and mass transfer during drying occurs in the air and vapor films surrounding the droplet. This protective envelope of vapor keeps the particle at the saturation temperature. As long as the particle does not become completely dry, evaporation still takes place and the temperature of the solids does not approach the dryer outlet temperature. As a result, heat-sensitive products can be spray dried at relatively high air temperatures without the products' being harmed.

The atomizer is a critical component of the spray dryer. Producing droplets of specific size and surface area by atomization is a critical step in the spray drying process, Bayliss said. The degree of atomization influences the drying rate, and therefore the required particle residence time, and therefore the dryer size. All of the atomizing techniques can give good average particle size control, but there are differences in the particle size distribution.

The most commonly employed atomization techniques are pressure nozzle atomization, in which a spray is created by forcing the fluid through an orifice; centrifugal atomization, in which a spray is created by passing the fluid across or through a rotating wheel or disk; and two-fluid nozzle atomization, in which a spray is created by mixing a compressed gas with the fluid. The pressure nozzle gives the narrowest distribution of particles, Bayliss said; the centrifugal atomizer and two-fluid nozzle give broader distributions.

Multistage Spray Dryer photo courtesy of Niro, Inc.

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According to Dennis R. Heldman (732-932-9611), Professor of Food Process Engineering at Rutgers University, the atomizer is the spray dryer component that relates most specifically to particle size and particle size distribution, which in turn relates to dispersibility of the product for rehydration. The challenge has always been to find the atomization system that provides the most uniform distribution of droplets.

The drying chamber is also important, he said. The droplet needs sufficient time in the chamber to dry without contacting the walls. From an efficiency standpoint, the challenge is to come up with ways to reduce the energy consumption as much as possible, to make spray drying competitive with other systems.

Another aspect of the drying chamber, he said, is quality. Many components of food are heat sensitive, so we want to keep

Multistage Spray Dryer photo courtesy of Niro, Inc.

the residence time to a minimum, especially once the dry particle is formed and as much moisture as wanted has been removed. We also want to keep exposure to high temperature to a minimum, and this relates to the uniformity of particle size distribution. If different size droplets are present, by the time the largest droplet is dried, the smallest droplet will have been exposed longer than necessary. Thus, a narrow particle size distribution would improve the quality of any heat-sensitive component of the product, such as vitamins, color, or flavor.

The separator is the component of the system that separates the dry product from the air. Several types of separators are used, including cyclone separators, and bag filters. These are rather significant cost components of a spray drying system, Heldman said, and it's always a challenge to find more efficient, less costly ways to separate the dry particles from the air.

Heldman pointed out that there is also a safety issue unique to spray drying, compared to other types of dryers: the potential for spontaneous combustion of products that have explosive properties or are flammable. If small particles accumulate in corners and crevices within the drying chamber and are exposed to air, spontaneous combustion could occur, causing an explosion, as in grain elevators. All it takes is a spark from the electrical system. Manufacturers of these systems have to be careful and insulate the chamber from electrical connections.

Often, the dry particles are recirculated into the atomizer to agglomerate them. As moisture from the input liquid forms a film on the small particles, they clump together to form larger and more uniform particles. These larger particles are then dried, typically in a fluidized bed, often included in the spray dryer system.

Not much research has been done on improving spray drying, Heldman said, because many foods are low margin, and the process is expensive. We need products to justify emphasis on improving the process. Spray drying really needs to get a new look and extra-special research attention. One challenge is to develop good simulation models for design of spray dryers. We don't even have good enough models to do scaleup from pilot plant to commercial sizes, he said. This is an opportunity for young researchers looking for an area to work in.

Spray dryers are manufactured by a number of companies, among them Niro Inc., Hudson, Wis.; Carlisle Friesland (formerly Stork Friesland), Cockeysville, Md.; C.E. Rogers Co., Mora, Minn.; Spray Drying Systems, Inc., Randallstown, Md.; and others. Here's what company representatives said about their spray drying systems and the challenges ahead.

Greg Haugen (715-386-9371), Sales Manager, Niro, Inc., said that the biggest new area is use of bag filters that can be cleaned in place instead of cyclones. The company has sold several units throughout the world but is in the process of obtaining 3-A approval for use in the United States dairy industry.

The company's newest spray dryer design is the Multistage Spray Dryer, the MSD. It was first introduced to the dairy industry in the late 1980s for instantizing dairy products but has undergone changes which improve the instantizing by recycling the powder back to the dryer. The company began selling it for instantizing dairy protein in the U.S. in 1997, and several dryers are being used in the U.S.

Although not new, heat recovery systems are becoming more popular now as energy costs skyrocket. Air-to-air recovery systems preheat the inlet process air but are very hard to clean, he said. If a bag breaks in the bag house, it can cause a lot of problems. Niro's heat recovery system consists of a rectangular box with stainless-steel tubes inside. "Dirty" process air passes through the inside of the tubes, and clean air going into dryer passes along the outside of the tubes, exchanging heat.

Niro's most popular dryer in the dairy industry is the compact spray dryer with static fluid bed on the bottom, integrated with the drying chamber. It takes less room and is very energy efficient.

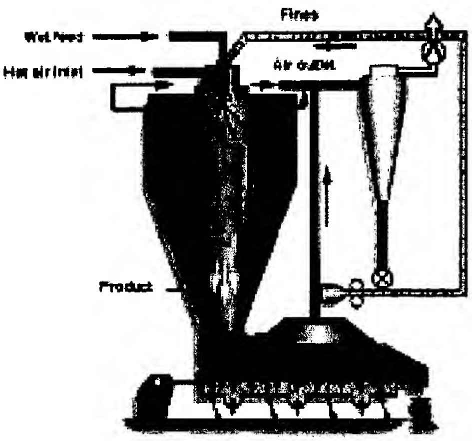
The challenge, Haugen said, is to develop a spray dryer to dry many types of products with a variety of different drying characteristics and produce "value-added" qualities in the final powders.

Jay Gilbert (410-628-2466), Manager of Drying and Concentration at Carlisle Friesland, said that in the past a lot of people used spray dryers to burn off the water and make a powder and didn't realize they could do other things. They were making very simplistic, single-stage-drying products. In the past few years, he said, more and more people have recognized that they can do value-added manufacturing by spray drying and agglomerating in one piece of equipment. More and more people are doing that, from the dairy industry for skim milk and whey protein concentrate, to other segments of the food industry.

The equipment recycles fines and reintroduces them into the drying process. While doing that, it's a simple thing to add other dry ingredients to produce value-added agglomerated products. For example, while agglomerating, trace quantities of liquid ingredients such as lecithin can be added to whey protein concentrate, to make the product more readily dispersible in water.

Carlisle Friesland uses a wide-body drying chamber, typically as big in diameter as it is high. Air goes in at the top of the dryer and is discharged out the top after passing down the center of the dryer and back up the walls. This design (see next page) provides maximum flexibility in keeping the walls of the dryer cool, controlling particle size, and keeping the dry product off the walls. This gives it a chance to get better classification of powder, with large particles falling out the bottom and fewer fines to have to pass through the cyclone. There is less sticking to the drying chamber walls because the walls are relatively cold. A fluidized bed at the bottom is an integral part of the dryer. Typically, the powder exits the drying chamber at something above finished product moisture content, and the balance of the

water is removed by the fluid bed dryer, which provides the most gentle drying possible. All the fines from the fluid bed dryer and spray dryer are then put through a special conveying system back into the top of the spray dryer with the spray. Fines are stuck back onto droplets, so agglomeration takes place at the top of the drying chamber.



Wide Body Spray Dryer photo courtesy of Carlisle Friesland

Gilbert concurred that the challenge ahead is to efficiently utilize energy to make high-quality products.

Howard Rogers (320-679-2172), President, C.E. Rogers Co., said that his company has built a dryer called the VSD that is being used by Agri-Mark, Middlebury, Vt., exclusively to dry whey permeate for use as animal feed. The system, however, is designed to produce product for human consumption as well.

It's a two-stage drying process, in which the critical design criterion is operating temperature. In the first stage, the main chamber dries product from 60% solids to 10% moisture, then the second stage takes it from 10% moisture to about a 3.5% moisture powder, which is then packaged. Between the two stages, the product is conveyed through an intermediary drying system. The secondary dryer is a fluidized bed. The system can dry more than 5,000 lb/hr.

One challenge ahead, he said, is to make the systems bigger, as the market dictates. With increasing size comes all types of challenges, not so much drying the powder but conveying the large volume to where you want it. Dryers can now dry more than 15,000 lb/hr, and just moving and cooling that volume is a challenge.

Another challenge is complying with federal regulations regarding sanitary aspects, he said, an ever-changing, ongoing challenge. And another is incorporating a fire suppression system for these dryers that is functional and in compliance with sanitation requirements. It needs to address every area that could be exposed to fire. As spray drying systems become larger and more complex, there is more area for exposure, and these systems need to put out a fire with the least damage to the equipment. In addition, the systems need overpressure vents on the main chambers and bag houses to minimize the potential for explosions. All spray drying equipment is now designed with overpressure vents and fire suppression systems, he said.

The company makes various types of spray dryers, including vertical, horizontal, and rotary. The newest version is a developmental dryer called the RDD, a low-process-volume dryer designed to dry specialty products such as proteins and high-fat food products. ●

Spray Drying Papers at the IFT Annual Meeting

Several papers related to spray drying will be presented during the IFT Annual Meeting in New Orleans, June 23–27, 2001.

• In paper 15D-19, "Spray Drying Microencapsulation of the Natural Colorant [illegible]," on Sunday morning, June 24, [illegible] of the Dept. of Food Technology [illegible] will report [illegible] of spray drying to microencapsulate [illegible] and increase its use as a food ingredient. The colorant [illegible] and the encapsulating agents were maltodextrin, gum arabic, and beta-cyclodextrin.

• In paper 91-6, "Mathematical Representation of Milk Spray Drying Dynamics Using a Mechanistic Model," on Wednesday morning, June 27, M.A. García from the Chemical Engineering Dept. of the Technological Institute of Veracruz, Mexico, will report on [illegible] spray drying of milk [illegible] one of the separation processes [illegible] in the food industry [illegible] consisted of four differential equations for the time dependence of four variables: air moisture and temperature, and product moisture and temperature.

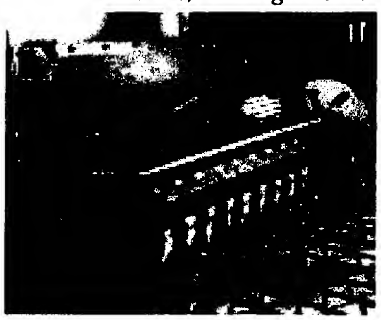
• In paper 44-7, "The Influence of the Composition of the Carrier Material on the Retention of Volatiles During Spray Drying," on Wednesday morning, J.C. [illegible] skim milk powder [illegible] total solids content of 40%.

The 2001 IFT Annual Meeting and IFT Food Expo will be held in New Orleans, La., June 23–27. Log onto www.ift.org for full information about the Technical Program and the exhibits.

PRODUCTS & LITERATURE

Phase Transition Analyzer™ measures the controlling glass transition (Tg) and melt transition (Tm) of a complex mixture of biopolymers such as food to help characterize an extrusion operation. The controlling Tg or Tm is the temperature at which a sufficient amount of sample is softened to allow for particle compaction (Tg) or melted to allow for flow (Tm). When a sample's Tg and Tm are combined with a mass and energy audit of an extrusion system, the user can accurately map the process. The instrument is a closed-end capillary rheometer, which uses a combination of pressure, temperature, time, and moisture to measure Tg and Tm. For more information, contact Wenger, 714 Main St., Sabetha, KS 66534-0130 (phone 913-284-2133, fax 913-284-3771, www.wenger.com)–or **circle 308.**

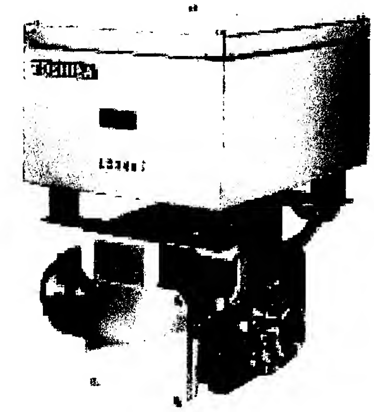
Masa Handling System, called Prelude™ is said to increase masa cohesiveness, enabling the sheeter to produce very thin restaurant-style tortilla chips and tortillas without breakage. Capable of accepting up to 1,200-lb batches of masa, the system uses multiple small-diameter variable-speed augers to condition the massa and extrude it in a uniform sheet onto the sheeter rolls. Conditioning the masa enables it to be sheeted thinner without breakage. It also reduces the load on the sheeter and helps produce more uniform corn products. For more information, contact Heat and Control, Inc., 21121 Cabot Blvd., Hayward, CA 94545 (phone 510-259-0500, fax 510-259-0600)—**or circle 309.**



Standard for Materials, design, and construction requirements for equipment used in meat and poultry processing has been adopted by the NSF International as an American National Standard. ANSI/NSF/3-A Standard 14159-1-2000, entitled "Hygiene Requirements for the Design of Meat and Poultry Processing Equipment," is the only standard supported by the American Meat Institute, Packaging Machinery Manufacturers Institute, Food Processing Machinery & Supply Association, and Meat Industry Suppliers Association. It has also been selected by the U.S. Dept. of Agriculture as the standard of choice for equipment evaluation. For more information, contact NSF, International, P.O. Box 130140, Ann Arbor, MI 48113-0140 (phone 800-673-6275 or 734-769-8010, fax 734-769-0109, www.nsf.org)—**or circle 310.**

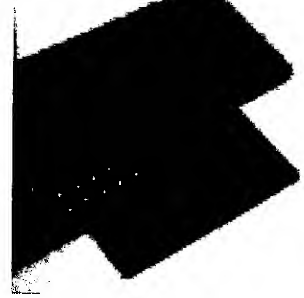
Porous Metal Media can be used for a variety of applications in the food and beverage processing industry. A high-precision sintering process, porous metal media can be made with strictly controlled, uniformly sized and distributed pores as small as 0.2 um. The media can be used for gas/liquid and gas/emulsion contacting, filtration, catalyst recovery, precoat filtration, and other applications, including juice clarification, yeast removal from beer production,clarification of sugar, aeration, carbonation, hydrogenation, oxygen stripping, bulking, fermentation, steam injection, pH control, and others. For a 6-p brochure describing the media, contact Mott Corp., 84 Spring Ln., Farmington, CT 06032-3159 (phone 800-289-6688 or 860-677-7311, fax 860-674-1489, www.mottcorp.com)—**or circle 311.**

Density Meter, the LQ300 Sanitary Microwave Total Solids Meter, uses microwaves to accurately determine the density or percent total solids of food in water or other solutions. The technology exploits the way the total amount of food in the process affects the propagation of microwaves as they pass through the fluid. By observing the microwave phase after it passes through the fluid, an accurate measurement of the total food solids present can be determined. The meter measures the amount of total food solids, including both suspended and/or dissolved concentrations. Typical applications include determination of amount of starch in water, density of food slurries, amount of dairy solids present, amount of malt extract for brewing, percent sugar concentration, percent water in evaporated milk, and percent water in dough and extruded solids. The 3A-approved meter can be mounted in the process line horizontally or vertically. Among its advantages are no pressure drop in the line, no vibration of the product, and no fouling of optical sensors. For more information, contact Toshiba International Corp., 13131 W. Little York Rd., Houston, TX 77041 (phone 800-231-1412 or 713-466-0277, fax 713-896-5225, www.toshiba.com)—**or circle 312.**



Cook/Chill Unit, the TurboJet™ Model TJ-100-CC, is a multitask machine that functions as a tumble chiller for cooling kettle-produced products, as a cook/chill tank for low-temperature water-bath cooking of meats, and as a sous vide unit for the production of home-meal replacements. It has a capacity of 100 gal for pumpable (kettle-produced) products and 700 lb of meat in the cook tank mode. Most pumpable products packaged in pouches or casings can be cooled from 170°F to 40°F in less than an hour. For a 4-p brochure describing the unit and its advantages, contact Cleveland Range Inc., 1333 E. 179th St., Cleveland, OH 44110 (phone 216-481-4900, fax 216-481-3782, www-clevelandrange.com)—**or circle 313.**

Molds for the manufacture of all types of molded chocolate products are available in various styles, as well as in various colors to help manufacturers keep track of them during production. Injection molds for bars and pieces can be made in standard shapes or custom designs and come in sizes 275 mm x 135 mm up to 2,000 mm in length. Thermoformed mold styles include single and double molds, book molds, and molds for one-shot depositing. For more information on the B.V. Vormenfabriek molds, contact American Chocolate Mould Co., Inc., 3194 Lawson Blvd., Oceanside, NY 11572 (phone 516-766-1414, fax 516-766-1485, www.americanchocolatemould.com)—**or circle 314.** ●



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